Using Primary Sources

What is a Primary Source?

Primary sources are accounts or interpretations by a person who has firsthand experience about a historical event. Primary sources are also original documents, images, and videos that were created at the time of the historical event by people who were present during the event.

Benefits of Using Primary Sources

Many students recognize history as a series of facts, dates, and events usually packaged as a textbook. The use of primary sources can change this view. As students use primary sources they begin to view their textbook as only one historical interpretation and its author as an interpreter of evidence, not the complete content expert. Primary sources will fascinate students because they are real and they are personal; history is humanized through them. Using primary/original sources, students are able to connect with the lives of the people about whom history is written and reflect the individual viewpoint of a participant or observer of an historical event. They participate in human emotions and in the values and attitudes of the past. Primary sources enable the student to get as close as possible to what actually happened during an historical event or time period. Primary sources provide first-hand testimony or direct evidence concerning a topic under investigation. Students become historians as they read the accounts of others, especially when there is a contradiction between a textbook account and the actual person interviewed. A student recognizes that what is in the textbook might not be an accurate account, especially when you hear something different from the person who did the research. (It is always a major accomplishment when students find mistakes in text and are able to prove their content is correct and render the content correction), also demonstrating the need to use more than one source when doing good research. Interpreting historical sources helps students to analyze and evaluate contemporary sources--newspaper reports, television and radio programs, and advertising, and learn to recognize how a point of view and a bias affect evidence, what contradictions and other limitations exist within a given source, and to what extent sources are reliable. Essential among these skills is the ability to understand and make appropriate use of many sources of information. By reading primary sources, students can learn to draw conclusions and better understand a historical period. The use of primary source documents in your teaching can present a challenge, but the benefits your students will gain in basic skill building and in critical analysis make the challenge well worthwhile.

Student Learning Components:

Research: Students master an understanding of the content through listening to primary source interviews, reading articles, image analysis, and /or video observations.

Communicating Science: Students share their research through an oral presentation.

Communicating Science: Students demonstrate their own mastery of the content through a selection of images and data to enhance their own oral or written presentation.

Ownership: Students construct a personalized content report that demonstrates mastery of the content.

Analytic interpretation: Students collect and record data.

Higher Level Thinking: Students summarize the data in written or oral format.

Modalities for Learning:

Auditory: This learner does best by listening and responds to verbal instructions. They solve problems by talking them out.

Visual: This learner does best through demonstrations and descriptions. They often make lists or drawings to develop solutions. They have well developed imaginations.

Tactile: This learner does well with projects or demonstrations. They like hands-on. They need to take notes when learning something new.

Kinesthetic: This learner does best when they are actively involved. They learn best by doing and often have problems sitting still and lose much of what is said or read.

Next Generation Science Standards- Nature of Science-Science assumes that objects and events in natural systems occur in consistent patterns that are understandable through measurement and observation. (MS-ESS1-1),(MS-ESS1-2)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

Use an oral and written argument supported by evidence to support or refute an explanation or a model for a phenomenon. (MS-LS1-3)

- Obtaining, evaluating, and communicating information in 6-8 builds on K-5 experiences and progresses to evaluating the merit and validity of ideas and methods.
- Gather, read, and synthesize information from multiple appropriate sources and assess the credibility, accuracy, and possible bias of each publication and methods used, and describe how they are supported or not supported by evidence. (MS-LS1-8)

Space Weather Research Using Primary Sources

Primary sources from *Space Weather Living History* promote original research for deeper understanding of the discoveries of Space Weather. Students will use several primary sources to develop the frame for their complete picture of a specific Space Weather discovery. In addition to primary interviews, images and videos provided through Space Weather Living History, the completed picture should also contain some information from a student's own research, and secondary sources to construct content knowledge and understanding about the steps it took to discover the mysteries of Space Weather.

Using the Space Weather Living History timeline:
http://spaceweatherhistory.org

You are interested in the aurora, and have several questions you would like to answer to complete a research project. You decided to start your search using an overarching concept and narrow the concept into a question that provides reasonable research: ***Aurora Discoveries and what they tell us about the sun.***

What causes an Aurora?

Key components

- Corona Mass Ejections
- Solar Storms
- Location and Height of Aurora (observations)

On the Timeline you see several possible entries that can provide information needed to answer your question-What causes an Aurora?

1733- Measuring the Height of the Aurora-Just a short review of the first textbook devoted to the aurora, you realize from this that the aurora was a curiosity and warranted textbook attention in the 1700's… you continue the search.

1770-Establishing the Connection between Aurora and Magnetic Storms

Make a list from the timeline of possible topics for your research-it might include the following timeline date points:

1733, 1770, 1748, 1751, 1860… however as you get closer to recent discoveries you will notice a change in the timeline- it now includes short videos to enhance your understanding.

1968-Akasofu Poses magnetic Substorms to Explain Changes in Aurora, a short video clip and cross references (some linked) are available for additional information.

2003-If you really want to go deeper into the subject see what is available on The Halloween Solar Storms 2003. Interviews are available and in the additional links- a Story Teller gives insight into The Spirit of the Aurora.

A more structured and teacher guided approach before the students begin their independent research can offer some content background making their research easier to comprehend and communicate accurately. They will use interviews located on the Sun-Earth Days website, http://sunearthday.nasa.gov this will also give those who are

learning about Space Weather some background information prior to using the Timeline on the website.

Engage:

In this section the teacher creates interest, generates curiosity, raises questions and elicits responses that uncover what the students know or think about the topic. The students first encounter and identify the instructional task. They make connections between past and present learning experiences, lay the organizational ground work for the activities ahead and stimulate their involvement in the anticipation of these activities.

The interviews were recently recorded to gather the information from witnesses who experienced the events or conditions being documented. These interviews have been developed to give a student the history of the discoveries of Space Weather and provide an opportunity for students to do their own research through *Primary Sources*. These are documented primary sources as oral histories. Also included are images, documents and videos that further tell of the research and/or the event found on the Timeline as described above.

Questions: How did a researcher select the field of study? How was their research viewed, were there contradictions? What was learned, how was that discovery used later to determine content correctness?
How to choose the correct interviews- find those that have a common interest and increase content knowledge, identify the sources- interview, written document, image…
(Example using the RHESSI Mission pod casts- Primary sources entire transcript on http://sunearthday.nasa.gov)

The teacher reminds students of the existing evidence and data and asks:
What do you already know?
What do you think you might enjoy researching?
Make a list of questions you still want to learn about.

Explore:

In this section the students have the opportunity to get directly involved with the content and materials. Involving themselves in these activities they develop a grounding of experience with the content. As they work together in teams, students build a base of common experience which assists them in the process of sharing and communicating. The teacher encourages the students to work together with minimum supervision, observes and listens to the students, asks probing questions to redirect the students' investigations when necessary. The teacher provides time for students to work through problems, and acts as a facilitator.

Big Idea (overarching concept):

What is space weather and how does it affect our Earth system?

Example-Essential Questions:

- What is a solar flare/coronal mass ejection?
- Where do we live in space?
- Why is it important to study space weather?

- How has the research lead to what we know about space weather?

Use of the Timeline-1859 Visible Solar Flare Sighted by Carrington and Hodgson is a good place to have students develop an understanding of a solar flare, the *Big idea:*

Continued research has determined the cause of *space weather* and its effects on Earth. *(Determine if you agree or disagree with this statement based on your research of the space weather topic- solar flares)*

Explain:

In this section the student begins to put the abstract experience through which she/he has gone into a communicable form. Language provides motivation for sequencing events into a logical format. Communication occurs between peers, the facilitator, or within the learner himself. Working in groups, learners support each other's understanding as they articulate their observations, ideas, questions and hypotheses. The teacher encourages the students to explain concepts and definitions, asks for justification (evidence) and clarification from students, formally provides definitions, explanations, and new labels, and uses students' previous experiences as the basis for explaining new concepts.

Listen to audio pod-casts on the Sun-Earth Days website
http://sunearthday.nasa.gov/discoveries/

Dr. Michael Hesse

From the transcript:

Well, in many ways, this started -- for me, this started in the -- maybe the mid-'90s or so, where I was involved in what is referred to as the Geospace Environment Modeling project that was funded by the National Science Foundation, which is looking into generating what they called a Geospace General Circulation Model, which is the equivalent of what you do for the atmosphere, but then for Geospace, and it was realized as part of this that the creation of such a model would have implications also for the space environment or with utility for space environment specification and forecasting. Everything was in its infancy at that time. At the same time, it was also realized that for such a model to exist and have a maximum benefit, it would be extremely useful to have a facility which would host such a model or such models and make those available for the science community, evaluate those models, and test them and perhaps facilitate their transition into space weather forecasting.

Dr. Madhulika Guhathakurta

From the transcript:

And then the way I would answer the question, when did my interest begin in space weather, is sort of the very beginning of my research career in Astrophysics. I was trained as an astrophysicist in graduate school. I specialized in just one star, however, the sun. You can also call me a “solar physicist. And in my research, I sort of expanded this specialization to include the study of the sun’s effects on Earth.

Dr. Richard Fisher

From the transcript:

I think at this point you would call me a high mileage, this treaded, Astrophysicist. For awhile I was involved with solar research, and then with the administration of the NASA program in solar research, and also heliophysical research for about the last ten years. What I am interested in primarily is kind of a straightforward thing. I would like to be able to visualize the processes which modulate the Earth. The Earth is embedded in the sun's atmosphere, as I'm sure that point has been made, and because we are embedded in the sun's atmosphere and magnetic field, it impacts the Earth and it changes things on Earth.

Using the quote from the interview to determine a quick relevance to your question; listen to the audio pod-cast to gain information from those who do the research. After listening to the podcasts check the Timeline, some possible date points- 1951 Solar Wind Discovered, 1966 Fairfield and Cahill Show Magnetic Activity Determined by Polarity of Solar Wind (solar wind).

Elaborate:

In this section the students expand on the concepts they have learned, make connections to other related concepts, and apply their understandings to the world around them. The teacher expects the students to use formal labels, definitions, and explanations provided previously, and continue to encourage the students to apply or extend the concepts and skills in new situations.

Students will use the primary sources to develop a written report and develop the report into a format that they determine; written as a formal research paper, a news report, an oral presentation, in order to communicate their own story about the content they discovered through the use of the primary sources. The students should include images and videos where possible.

Evaluate:

This is an on-going diagnostic process that allows the teacher to determine if the learner has attained understanding of concepts and knowledge. Evaluation and assessment can occur at all points along the continuum of the instructional process

Students should create their own time line of the content they have researched. This timeline is based on a particular discovery not the entire history of space weather.

Students could communicate the science using a different media presentation. This would clearly demonstrate mastery of the science, and demonstrate the interest level of the student.